DOCUMENT RESUME

ED 288 346 FL 016 807

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TITLE Structure of Intellect Factors and Foreign Language Learning.
PUB DATE 80
NOTE 6p.; Document is not available in paper copy because of small type size; document is part of a set of Structure of Intellect studies.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS Aptitude Tests; *Cognitive Structures; *Cognitive Style; Comparative Analysis; High Schools; High School Students; *Intellectual Development; Intelligence Differences; *Language Aptitude; Language Skills; *Learning Strategies; Mexican Americans; Predictive Validity; Predictor Variables; *Second Language Learning
IDENTIFIERS Pimsleur Language Aptitude Battery; *Structure of Intellect

ABSTRACT

A study of the intellectual talents involved in learning a foreign language compared the composite predicted score of high school students on the Pimsleur Language Aptitude Battery with selected factor scores on the Structure of Intellect-Learning Abilities Test to determine whether any of the factors correlate highly with foreign language learning ability. Findings include these: (1) Mexican-American students are deficient in the Structure of Intellect (SOI) factor of Cognition of Semantic Systems; (2) Caucasian students are deficient in the SOI factor of Memory for a Symbolic System-Auditory when compared with Mexican-Americans; (3) first- and second-year foreign language students are deficient in the SOI factor of Convergent Production of Symbolic Transformations when compared with third- and fourth-year students; (4) first-year foreign language students are deficient in the SOI factor of Cognition of Semantic Units when compared with second-, third-, and fourth-year students; and (5) the SOI factors of Cognition of Semantic Units, Cognition of Semantic Systems, and Convergent Production of Symbolic Systems-Auditory are reliable predictors of success in foreign language study as tested by the Pimsleur battery and SOI in correlation. Pedagogical recommendations based on these results are presented. (MSE)

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STRUCTURE OF INTELLECT FACTORS AND FOREIGN LANGUAGE LEARNING

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This study attempted to reduce the problem of learning a modern foreign language to its simplist terms by identifying the unique intellectual talents which, in combination, contribute to the success of the foreign language student.

Is there a special "gift" possessed by language talented individuals? How might one know if he or she is fortunate enough to have this "gift"; or if even there is such a "gift". There was a need to test the intellectual factors which correspond to foreign language learning and discover what they are so a person might enter with some degree of confidence in a foreign language class, or at least know where one might improve in order to be successful.

The Structure of Intellect pioneered by Guilford and applied to a model for eduction by Meeker hypothesizes 120 different intellectual factors and through controlled studies has identified nearly one hundred of these. The Structure of Intellect (SOI) model provides a classification which is readily usable to separate the several talents most closely aligned with foreign language learning.

Until now there has not been any current data which link potential success in learning a foreign language with selected Structure of Intellect factors.

This study was designed to compare the composite predictive scored of high school students on the Pimsleur Language Aptitude Battery with selected factor scores on the Structure of Intellect-Learning Abilities Test to determine if any of the selected factors of the intellect highly correlate with foreign language learning ability.

Knowledge of Structure ofintellect factors which prove to be strong predictors of foreign language learning ability will provide useful information for counselors and language teachers in helping students to make decisions concerning foreign language study since the factors may be isolated and tested easily and quickly for diagnostic and remedial purposes.

The Pimsleur Language Aptitude Battery, developed in the sixties by Paul Pimsleur, and copyrighted and published by Harcourt, Brace and World, Inc. in 1966, predicts within certain limits, a students potential for foreign language learning.

It is made up of six parts:

1. Grade-point average – the average of the student's most recent final grades in major subjects.
2. Interest – the student's desire to study a foreign language.
3. Vocabulary – the students knowledge of English words.
4. Language analysis – the students ability to manipulate grammar analytically.
5. Sound discrimination – the student's ability to tell foreign sounds apart.
6. Sound-symbol association – the student's ability to correctly associate sounds with their written form.

The Pimsleur Language Aptitude Battery has 117 possible points in the composite score. A student with a high score, seventy or above, on the Pimsleur Language Aptitude Battery would very likely do well in foreign language study. A student scoring low, under fifty, would probably do poorly in foreign language.

The Structure of Intellect-Learning Abilities Test was chosen in an effort to isolate selected Structure of Intellect factors related to foreign language learning because of its relative ease of administration and the hoped for correlation between predicted success in foreign language and the Structure of Intellect factors. Hoepfner, Guilford and Bradley were able to demonstrate that a battery of Structure of Intellect factor scores could very accurately predict scholastic achievement. If this achievement can be predicted for the total school experience, for arithmetic and spelling, for reading achievement at the seventh and eight grade level, for learning to read and many others, why could not Structure of Intellect factors also predict the propensity of a student to find ease in the learning of a second language?

The subjects of the study were male and female students enrolled in French and Spanish, and students who chose not to take a foreign language at William Workman High School, City of Industry, Los Angeles county, California, during the fall semester of 1978. William Workman High School is in the Hacienda-La Puente Unified School District and is representative of broad sociometric and multi-ethnic groups.

The subjects were chosen from social studies and foreign language classes and represented the broadest range of intellectual abilities that could be obtained from the main stream students. Twelve entire classes were tested and individual testing was only done in the case of make-ups. There were three hundred students in the sample which represented 19.1 % of the school population.

In this study a comparison was made of the composite score of the student on the Pimsleur Language Aptitude Battery with his/her score on the individual factors identified by the Structure of Intellect-Learning Abilities Test. The Pimsleur Language Aptitude Battery was the dependent variable in a multiple regression analysis and the Structure of Intellect-Learning Abilities Test factors, plus sex, ethnic background, bilingual ability, study of high school French, study of high school Spanish, and study of no foreign language were the independent variables.

Findings

Based on the analysis performed in this study, the following findings were made. They are presented in sequential order according to the specific question with which they are associated.

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Question 1

To what extent were the following Structure of Intellect factors evident in students whose foreign language learning success was predicted by the Pimsleur Language Aptitude Battery?

1. Cognition of Symbolic Relations,
2. Cognition of Semantic Units,
3. Cognition of Semantic Systems,
4. Memory of a Symbolic System-Auditory,
5. Convergent Production of Symbolic Transformations,
6. Convergent Production of Symbolic Implications.

All six factors were found to be the best of the twenty-three Structure of Intellect factors tested as indicators of foreign language study success when correlated with the Pimsleur Language Aptitude Battery. Four of the six factors in combination were chosen for their high correlation figure of .714, the remaining two did not raise that figure significantly. The factors contributing to the high correlation were Cognition of Semantic Units (CMU), Cognition of Semantic systems (CMS), Convergent Production of Symbolic Transformation (NST), and Memory for Symbolic Systems-Auditory (MSS-A). (See table 1)

Table 1. Best Combinations of Structure of Intellect Factors Correlated With Raw Scores on the Pimsleur Language Aptitude Battery*

Variables	r-square	Correlation
NST	0.371	0.609
CMU	0.318	0.564
CMS	0.279	0.528
CSR	0.204	0.452
NSI	0.129	0.359
MSS-A	0.098	0.313
Best two--CMU, NST	0.458	0.677
Best three--CMU, CMS, NST	0.491	0.701
Best four--CMU, CMS, NST, MSS-A	0.510	0.714
Best five--CMU, CMS, NST, MSS-A, CSR	0.521	0.722
Best six--CMU, CMS, NST, MSS-A, CSR, NSI	o.521	0.722

*Other Structure of Intellect factor correlations are not shown here since they were so small as not to be significant.

Question 2

Were there any differences in the Structure of Intellect factor scores of make students vs. female students who scores fifty or over (predicted success) on the Pimsleur Language Aptitude Battery?

It was found that there was no significant difference in the mean scores of the four factors analyzed with relationship to sex.

Question 3

Was there any difference in the Structure of Intellect factor scores of Caucasian, Mexican-American, and other ethnic minorities who scored fifty or over on the Pimsleur Language Aptitude Battery?

There was a significant difference found in the mean scores of the CMS variable where the Caucasian students scored higher than the Mexican-American students. The means of the MSS-A variable for the Mexican-American students were significantly higher than for the Caucasian students. (See Tables 2, 3 and 4)

Table 2. Distribution by Ethnic Origin

Students	Caucasian	Mexican-American	Other	Total
All Students	140	127	33	300
Students scoring 50% on the PLAB	127	107	31	265

Table 3.

Comparison of Means for Cognition of Semantic Units (CMU), Cognition of Semantic Systems (CMS), Convergent Production of Symbolic Transformations (NST), and Memory for a Symbolic System-Auditory (MSS-A) With Ethnic Origin

Level	N	CMU Mean	CMS Mean	NST Mean	MSS-A Mean
Caucasian	127	10.790	23.066	11.948	16.442
Mexican-American	107	9.754	20.839	11.834	17.730
Other	31	10.372	22.490	10.387	17.678

Table 4.

Analysis of Variance Table for Cognition of Semantic Units (CMU), Cognition of Semantic Systems (CMS), Convergent Production of Symbolic Transformations (NST), and Memory for a Symbolic System-Auditory (MSS-A) With Ethnic Origin

Source	df	Dependent Variable	SS	F-Ratio	Significance Level
Ethnic Origin	2	CMU	8.448	0.778	0.460
		CMS	42.679	3.237	0.041*
		NST	14.326	0.359	0.699
		MSS-A	12.903	2.512	0.050*

*Significance at .05 level

Question 4

Was there any difference in the Structure of Intellect factor scores of those students who already possessed a bilingual ability in some language and those who did not have such an ability who scored fifty or over on the Pimsleur Language Aptitude Battery?

No sigificant differences were found in the mean scores on the four Stucture of Intellect factors analyzed for English speakers and bilingual students.

Question 5

Was there any difference in the Structure of Intellect factor scores of those students studying French, Spanish, or no foreign language who scored fifty or over on the Pimsleur Language Aptitude Battery?

The students studying Spanish and those not studying any language had significantly higher mean scores for the NST factor than did students studying French. The Spanish and non-language students had significantly higher mean scores for the MSS-A factor than did the French students. (See Tables 5, 6, and 7)

Table 5.

Distribution by Foreign Language Studied

Students	French	Spanish	Non-Language	Total
All students	34	169	97	300
Students scoring 50% on the PLAB	33	162	70	265

Table 6.

Comparison of Means for Cognition of Semantic Units (CMU), Cognition of Semantic Systems (CMS), Convergent Production of Symbolic Transformaions (NST), and Memory for a Symbolic System-Auditory (MSS-A) With Foreign Language Study

Table 10

Analysis of Variance Table for Cognition of Semantic Units (CMU), Cogniton of Semantic Systems (CMS), Convergent Production of Symbolic Transformations (NST), and Memory for a Symbolic System-Auditory (MSS-A) With Level of Language Study

Source	df	Dependent Variable	SS	F-Ratio	Significance Level
Level of Language Study	2	CMU	49.391	4.410	0.013*
		CMS	10.050	0.783	0.459
		NST	15.390	3.973	0.020*
		MSS-A	10.679	1.339	0.265

*Significance at .05 level

Question 7

Was there any difference in the Structure of Intellect factor scores of those students who scored fifty or higher on the Pimsleur Language Aptitude Battery and those who scored forty-nine or less?

The students who scored fifty and above were significantly higher than their counterparts who scored forty-nine or less on the factors CMS, CMU, and MSS-A. (See Tables 11, 12 and 13)

Table 11.

Distribution by PLAB Score

50 & Over	49 & Less	Total
265	35	300

Table 12.

Comparison of Means for Cognition of Semantic Units (CMU), Cognition of Semantic Systems (CMS), Convergent Production of Symbolic Transformations (NST), and Memory for a Symbolic System-Auditory (MSS-A) With Scoresd of 50 or Over and 49 or Less on the PLAB.

Level	N	CMU Mean	CMS Mean	NST Mean	MSS-A Mean
High (50+)	265	10.291	21.842	13.581	17.672
Low (49–)	35	8.943	17.829	12.371	15.829

Table 13.

Analysis of Variance Table for Cognition of Semantic Units (CMU), Cognition of Semantic Systems (CMS), Convergent Production of Symbolic Transformations (NST), and Memory for a Symbolic System-Auditory (MSS-A) With Scores of 50 or Over and 49 or Less on the PLAB.

Source	df	Dependent Variable	F-Ratio	Significance Level
PLAB Score	1	CMU	9.626	0.002*
		CMS	55.854	0.000*
		NST	2.084	0.150
		MSS-A	18.917	0.000*

* Significance at .01 level. CMS and MSS-A significance levels were such small numbers that they could not be represented in three decimal places.

Findings Unrelated to a Specific Question

1. Using CMS, CMU, NST, and MSS-A as predictors of a student's score on the Pimsleur Language Aptitude Battery, it was found that they could predict 111 out of 300 students within + 5, 196 out of the 300 within + 10, 228 of the 300 within + 12, and 261 of the 300 within + 15. With 117 total points on the Pimsleur Language Aptitude Battery, this was considered to be a statistic crucial to verifying the validity of this study.

2 Combinations of sex, ethnic origin, bilingual ability, and foreign language studied were analyzed and the data which are very lenghthy appear in the author's dissertation and are available from the author.

Level	N	CMU Mean	CMS Mean	NST Mean	MSS-A Mean
French	33	10.507	21.567	8.262	16.270
Spanish	162	10.941	22.639	13.355	17.562
Non-language	70	9.468	22.179	12.553	18.017

Table 7.

Analysis of Variance Table for Cognition of Semantic Units (CMU), Cognition of Semantic Units (CMS), Convergent Production of Symbolic System-Auditory (MSS-A) With Foreign Language Study

Source	df	Dependent Variable	SS	F-Ratio	Significance Level
Foreign Language Study	2	CMU	23.914	2.193	0.114
		CMS	7.814	0.593	0.554
		NST	15.798	3.960	0.020*
		MSS-A	15.369	2.993	0.052*

*Significance at .05 level

Question 6

Was there any difference in the Structure of Intellect factor scores of those students in the first year of language study, the second year of language study, and the third and fourth years of language study?

The second, third, and fourth year foreign language students had significantly higher means for the CMU factor than did the first year foreign language students. The third and fourth year foreign language students had significantly higher mean scores on the NST factor than did the second year students. (See tables 8,9, and 10)

Table 8.

Distribution by Year of Foreign Language Study

First Year	Second Year	Third & Fourth Year	Total
32	130	41	203

Table 9

Comparison of Means for Cognition of Semantic Units (CMU), Cognition of Semantic Systems (CMS), Convergent Production of Symbolic System Transformations (NST), and Memory for a Symbolic System-Auditory (MSS-A) With Level of Language Study

Level	N	CMU Mean	CMS Mean	NST Mean	MSS-A Mean
First Year	32	9.344	21.562	13.469	17.906
Second Year	122	10.721	22.074	13.246	17.434
Third & Fourth Year	41	10.634	22.293	15.463	17.927

Conclusions

Based on the findings of this study, the following conclusions were made:

1. Mexican-American students are deficient in the Structure of Intellect factor of Cognition of Semantic Systems as tested by the Structure of Intellect-Learning Abilities Test. This was a test where the student had to translate a verbal description through a set of word shape equivalences into a set of shape relationships. Word sequencing and word reasoning talents were found to be lacking in the Mexican-American student, perhaps due to bilingualism at home. Bilingualism in the home gives some advantages in casual situations to the child which, according to the data gathered in this study, become disadvantages in an academic setting where critical communication, both oral and written, becomes imperative.

2. Caucasian students are deficient in the Structure of Intellect factor of Memory for a Symbolic System-Auditory when compared with Mexican-American students as tested by the Structure of Intellect-Learning Abilities Test. Attention span and concentration were necessary to do well on this factor test. A very definite difference was observed in the ethnic groups on this test which, in the opinion of the inverstigator, might indicate the importance placed on auditory memory in the Mexican-American culture in contrast to the written word.

3. First and second year foreign language students are deficient in the Structure of Intellect factor of Convergent Production of Symbolic Transformations when compared with third and fourth year foreign language students as tested by the Structure of Intellect-Learning Abilities test. The investigator believes this is due to a more rapid rate of word recognition which is a product of cumulative practice by the more mature language student.

4. First year foreign language students are deficient in the Structure of Intellect factor of Cognition of Semantic Units when compared with the second and third and fourth year language students as tested by the Structure of Intellect-Learning Abilities Test. In the opinion of the investigator, this difference occured because the second, third and fourth year students had been involved with studying a foreign language over a period of time and as a by-product of this study, the advanced students were taught word relationships and meanings.

5. The Structure of Intellect factors Cognition of Semantic Units (CMU), and Cognition of Semantic Systems (CMS), Convergent Production of Symbolic Systems-Auditory (MSS-A) are reliable predictors of success in foreign language study as tested by the Structure of Intellect-Learning Abilities Test and correlated with the Pimsleur Language Aptitude Battery. This was found to be so by using the Structure of Intellect factor scores to predict the score of the student on the Pimsleur Language Aptitude Battery and by predicting 261 out of 300 students within fifteen points of their observed score.

Recommendation

Based on the finding and conclusions of this study, it is recommended that:

1. Parents and teachers should provide Mexican-American students with opportunities to enhance vocabulary development in both English and in the foreign language they study.

2. Teachers of Caucasian students in classes where listening skills are critical should see to it that these students receive considerably more acute auditory rehearsal.

3. Students who demonstrate a difficulty with Cognition of Semantic Units (CMU),Cognition of Semanic Systems (CMS), Convergent Production of Symbolic Transformations (NST), and Memory for Symbolic Systems-Auditory (MSS-A) should be given special care in advanced English classes and in foreign language classes. Individual attention will need to be given to these students by their teachers for these students to be successful.

4. Parents and teachers need to see that Mexican-American students have opportunities to develop more discipline in understanding and following directions.

5. Students having difficulty in the study of a foreign language should be tested in the four Structure of Intellect factors examined in this study, Cognition of Semantic Units (CMU), Cognition of Semantic Systems (CMS), Convergent Production of Symbolic Transformations (NST) and Memory for Symbolic Systems-Auditory (MSS-A), to determine where the weakness lies. That particular factor where the student is deficient may be strenghtened through a series of appropriate exercises aimed at that factor.

6. This study should be replicated with regard to French students using a larger number of students in the sample. Potential students of other foreign languages should also be included in future studies.

Impressions of the Investigator

The investigator feels that as early as sixth grade those students scoring at the eleventh grade level in Cognition of Semantic Units (CMU), Cognition of Semantic Systems (CMS), Convergent Production of Symbolic Transformations (NST), and Memory for Symbolic Systems-Auditory (MSS-A) should be counseled to study a foreign language.

Though there was no way to indicate this in the study, it should be noted that all of the students in the top two standings of the Pimsleur Language Aptitude Battery were musicians of varying degrees of accomplishment. A further study involving musically talented students with relations to foreign language could prove to be enlightening.